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PATENT

UNITED STATES PATENT APPLICATION

of

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for

TRANSVERSELY MOVING CABLE CONTROL

CROSS-REFERENCE TO RELATED APPLICATION

This is a continuation of copending U. S. application Serial No. 08/902,987, filed on 07/30/1997.

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

This invention relates to a control for transversely moving cables, especially those cables which operate such devices as the brakes on a bicycle.

DESCRIPTION OF THE RELATED ART

There are many patented systems for controlling a cable to operate devices on a bicycle.

A significant number of these patents apply to devices which simply pull the cable from one end to exert a pulling force to control a device connected to the other end of the cable. Examples of this type of control are found in United States patent numbers 2,560,154; 4,005,613; and 5,584,210.

Also, a substantial number of patents cover devices which utilize a second cable to pull at an intermediate point on a first cable to create pulling forces on both ends of the first cable. To this category belong United States patent numbers 4,026,390 and 4,143,745; the embodiment represented by Figure 8 in United States patent number 4,653,613; and United States patent numbers 5,564,531 and 5,582,272. None of these patents, however, employ devices to maintain the first cable (at points other than the area where the second cable acts and the ends of such first cable) in substantially the original position of such first cable.

United States patent number 4,245,522 simply has a first lever connected by a first cable to a second lever which is connected to the cable which leads to the device to be operated. Moving either lever will then pull on a first end of the cable leading to the device to be operated by the consequent pull by the second end of such cable.

The control invention of United States patent number has a lever at each upper end of a Y-shaped cable so that using either lever to pull its associated segment of the cable will create a pull at the bottom of the cable to operate a device.

A sheath designated an "outer cable" covers an "inner cable" in the invention of United States Patent number 4,901,595. At an intermediate point the sheath is divided perpedicularly to its length. The divided segment nearer the device to be controlled is held in place while the other segment is rotated away from the segment nearer the device, thereby pulling on the inner cable and creating a pull on the end of the cable which operates a device.

Finally, the invention of United States patent no. 5,540,304 utilizes a first cable attached by a first pulley to a lever in order to move such lever and thereby to create a mechanical advantage by moving a second pulley that is attached to the lever at a position farther from the pivot point than is the first pulley. This second pulley then pulls on a second cable at an intermediate point. The segments of the second cable must, however, be parallel to one another as they depart from the second pulley.

SUMMARY OF THE INVENTION

The Transversely Moving Cable Control, as its name implies, creates a pull on one or both ends of a cable by exerting a force transverse to the path of the cable while maintaining the cable (at points other than the area where the second cable acts and the ends of the cable) in substantially the original position of the cable.

Such transverse movement, consequently, causes at least one end of the cable to be drawn longitudinally closer to the Transversely Moving Cable Control, just as in the case of the control systems of the prior art. And allowing the cable to move transversely closer to its original path permits such end of the cable to move farther from the Transversely Moving Cable Control since the cable--when the lever has been moved from its original (rest) position--traditionally has some force acting longitudinally along the cable in the direction opposite to the movement caused by the transverse movement of the cable away from its original path. Again, the resultant effect is the same as that achieved with a traditional control system.

Since the activating force for a device is not created by pulling one end of the cable, the Transversely Moving Cable Control can be position either at an end of the cable or at an intermediate position along the cable.

Moreover, no outer cable or sheath is necessary; and the segments of the cable do not have to be parallel to one another as such segments depart the Transversely Moving Cable Control.

And the mechanical advantage of the Transversely Moving Cable Control can be made adjustable.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates an embodiment of the Transversely Moving Cable Control which differs from the preferred embodiment only in the fact that the pivot for the pulley that transmits the transverse force to the cable is not adjustable.

Figure 2 shows the preferred embodiment for the Transversely Moving Cable Control.

Figure 3 depicts an alternate embodiment of the Transversely Moving Cable Control.

Figure 4 portrays the embodiment of Figure 1 where a first end of the cable has been anchored just beyond the exit aperture of the lever.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As illustrated in Figure 1, the Transversely Moving Cable Control has a lever **1** rotatably attached to a hollow base plate **2** with a pivot **3**.

When the lever **1** has been rotated into the base plate **2** to the maximum extent possible, the cable **4** follows its original path. As the lever **1** is rotated outward from the base plate **2**, the cable **4**, between a cable guide **7** and an exit **8** from the lever **1**, *i.e.*, the portion of the cable **4** which is within the transversely moving cable control, is moved substantially transversely to the original path of the cable **4**, preferably by a pulley **9** attached to the lever **1** across which pulley **9** the cable **4** runs, although a simple projection would suffice for this purpose, while the cable guide **7** and the exit **8** maintain the segments which lie outside the cable guide **7** and the exit **8**, *i.e.*, the outer segments of the cable **4**, in substantially the original positions of such segments of the cable **4**. If a first end **5** of the cable **4** is anchored, such outward rotation of the lever **1** draws a second end **6** of the cable **4** longitudinally closer to the Transversely Moving Cable Control. Even, however, if the first end **5** of the cable **4** is not anchored, greater friction is encountered by the cable **4** within the lever **1** than within the cable guide **7** that is preferably rotatably attached to the base plate **2** so that generally only the second end **6** of the cable **4**, and not the first end **5**, is drawn closer to the Transversely Moving Cable Control. (As a practical matter, though, the first end **5** of the cable **4** is always anchored, either at the exit **8** for the cable **4** from the lever **1** or at some point farther from the exit **8** when used with a bicycle. And, in fact, the exit **8** could be eliminated and methods that are well known in the art could be used to adapt the lever for attachment of the first end **5** of the cable **4**, such as simply enlarging the cable **4** just beyond the exit **8** outside the lever **1**, as illustrated in Figure 4.)

Similarly, as the lever **1** is allowed to rotate into the base plate **2**, the cable **4** is moved transversely closer to the original path of the cable **4** so that the second end **6** of the cable **4** is allowed to move longitudinally farther from the Transversely Moving Cable Control.

The distance which the cable **4** is moved--and, consequently, the mechanical advantage of the Transversely Moving Cable Control--can be increased either by having the pulley **9** removably attached to the lever **1** and replacing the original pulley **9** with a pulley **9** having a greater diameter than the original pulley **9** or by moving the pivot **10** of the pulley **9** farther from the pivot **3** within the channel **26**, which in the preferred embodiment of the Transversely

Moving Cable Control exists--as portrayed in Figure 2, within the lever **1**, so that when the lever **1** is rotated outward from the base plate **2**, the pulley **9** will be farther from the original path of the cable **4**. (The pivot **10** can be released, moved within the channel **26**, and releasably fastened at another location within the channel **26** by using techniques which are well known in the art.)

A second major embodiment of the Transversely Moving Cable Control is depicted in Figure 3.

The cable **11** runs through two cable guides **12**. The cable guides **12** are preferably pivotally mounted in a substantially U-shaped housing **13**. One cable guide **12** is mounted, preferably pivotally, near a first end **14** of a first leg **15** of the U-shaped housing **13**. The other cable guide **12** is mounted, preferably pivotally, near a first end **16** of a second leg **17** of the U-shaped housing **13** . The cable guides **12** maintain the segments of the cable **11** which are outside the housing **13** and, therefore, outside the transversely moving cable control, in substantially the original positions of such segments of the cable **11**. (The cable guides **12** are preferable but could be replaced by apertures near the first end **14** of the first leg **15** and near the first end **16** of a second leg **17**.)

A secondary cable **18** passes through an aperture **19** beginning in the second end **20** of the U-shaped housing **13** and extends into the space between first leg **15** and second leg **17** of the U-shaped housing **13** before being attached to a block **21**. The cable **11** passes through the block **21** between the point of attachment of the secondary cable **18** and a pulley **22**. (Although pulleys are preferable since they reduce friction, any time a pulley is mentioned such pulley could be replaced by a stationary cylinder or other cable displacement device.)

As the block **21** is drawn by the secondary cable **18** toward the aperture **19**, the portion of the cable **11** which is within the transversely moving cable control, specifically within the housing **13**, is moved substantially transversely to the original path of the cable **11**. Since both cable guides **12** are identical, both the first end **23** and the second end **24** of the cable **11** will be pulled longitudinally closer to the U-shaped housing **13**. If only the first end **23** of the cable **11** is anchored, only the second end **24** of the cable **11** will be pulled longitudinally closer to the U-shaped housing **13**. Just as with the first embodiment of the Transversely Moving Cable Control, the first end **23** of the cable can be anchored at a first end **25** of the cable guide **12** in the first leg **15** of the U-shaped housing **13** (or, if the cable guide **12** in the first leg **15** were eliminated,

simply to the first leg **15**, itself, at a point adapted for attachment of the cable **11**) or at some point farther from the first end **25** of the cable guide **12**.

Similarly, as the block **21** is allowed to move farther from the aperture **19**, the cable **11** is permitted to move transversely closer to the original path of the cable **11**, thereby permitting the unanchored end **24** (or unanchored ends **23**, **24**) of the cable **11** to move longitudinally farther from the U-shaped housing **13**.

As long as the first end **23** and the second end **24** of the cable **11** are not parallel to one another, the larger the diameter of the pulley **22**, the greater will be the movement of the end **24** or both ends **23**, **24** of the cable **11** and, consequently, the greater will be the mechanical advantage of the Transversely Moving Cable Control.